



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification:</b> <b>B65D 47/34, B05B 7/00,</b> <b>B05B 11/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 00/78629</b> <b>(43) International Publication Date:</b> 28 December 2000 (28.12.2000)
<b>(21) International Application Number:</b> PCT/NL00/00441 <b>(22) International Filing Date:</b> 23 June 2000 (23.06.2000) <b>(30) Priority Data:</b> 1012419 23 June 1999 (23.06.1999) NL <b>(60) Parent Application or Grant</b> AIRSPRAY N.V. [/]; (). VAN DER HELJDEN, Edgar, Ivo, Maria [/]; (). VAN DER HELJDEN, Edgar, Ivo, Maria [/]; (). BAKKUM, R., J. ; ().		<b>Published</b>
<b>(54) Title: AEROSOL FOR DISPENSING A LIQUID</b> <b>(54) Titre: GENERATEUR D'AEROSOLS SERVANT A L'ADMINISTRATION D'UN LIQUIDE</b>  <b>(57) Abstract</b> <p>Aerosol for dispensing a liquid, in particular in the form of a foam, at least comprising a liquid container (2) and a dispensing assembly (1) which is coupled thereto at least in liquid-tight manner, the dispensing assembly (1) comprising a liquid pump (4) with a liquid inlet (15) and a liquid outlet (17), and an actuating head (10), the actuating head (10) comprising an outlet passage (12) and a dispensing opening (11) for dispensing the liquid, while the actuating head (10) furthermore comprises a closed, circumferential protective cap (14), the aerosol furthermore comprising a circumferential recess (27), into which the protective cap (14) can move, which recess (27) comprises a closed inner wall (29), an outer wall (30) and a base (28), and one or more outlet openings (31) are present in the vicinity of the base (28) of the recess (27), in which aerosol the shape of the recess (27) is such that the inner wall (29), on the side which is remote from the base (28), is at a radial distance p from the protective cap (14), which distance p is greater than the usual clearance distance of the protective cap (14) with respect to the inner wall (29).</p> <b>(57) Abrégé</b> <p>L'invention porte sur un générateur d'aérosols servant à l'administration d'un liquide, en particulier sous forme de mousse, et comportant au moins un récipient recevant un liquide (2) et un dispositif distributeur (1) lui étant relié hermétiquement. Le dispositif distributeur (1) comprend une pompe (4) avec une entrée (15) de liquide et une sortie (17) de liquide, et une tête d'actionnement (10) comprenant un passage de sortie (12) et un orifice de distribution (11) du liquide, ainsi qu'un capuchon protecteur (14) circulaire fermé. Le générateur d'aérosols comprend en outre un évidement circulaire (27) où peut se déplacer le capuchon protecteur. L'évidement circulaire (27) comprend une paroi intérieure fermée (29), une paroi extérieure (30), une base (28), et une ou plusieurs ouvertures proches de la base (28). La forme de l'évidement (27) est telle que le côté de la paroi intérieure (29) opposé à la base (28) se trouve à une distance radiale p du capuchon protecteur (14) supérieure au jeu normal entre le capuchon protecteur (14) et la paroi intérieure (29).</p>		

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Short title: Aerosol for dispensing a liquid

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The invention relates to an aerosol for dispensing a liquid, in particular in the form of a foam, at least comprising a liquid container and a dispensing assembly which is coupled thereto at least in liquid-tight manner, the dispensing assembly comprising a liquid pump with a liquid inlet and a liquid outlet, and an actuating head, the actuating head comprising an outlet passage and a dispensing opening for dispensing the liquid, while the actuating head furthermore comprises a closed, circumferential protective cap, the aerosol comprising a circumferential recess, into which the protective cap can move, which recess comprises a closed inner wall, an outer wall and a base, and one or more outlet openings are present in the vicinity of the base of the recess.

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An aerosol of this nature is known from JP-A-9-77115.

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Aerosols of the type referred to in the introduction are used, inter alia, to dispense liquids as such, such as toothpaste, gel, etc. There are also aerosols which are intended to dispense atomized air/liquid mixtures, such as deodorant, hair sprays, paint, etc. However, the latter type of aerosol may also comprise foam-forming means, so that the aerosol is suitable for dispensing foam products, such as shaving foam, soap, shower foam, etc.

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In the context of the present invention, the term liquid is understood as meaning both low-viscosity liquids and viscous liquids and pasty materials.

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In the aerosol described in JP-A-9-77115 the inner wall of the annular recess forms a substantially vertical guide wall for the protective cap. In other words, during use, the protective cap moves up and down along this inner wall in very close proximity thereto.

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In the case of personal hygiene products, the aerosol is frequently used in a damp environment, such as in a bathroom in the bath or under the shower. In the case of paint and other products, it is also necessary to prevent

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5 liquid products, such as the products to be dispensed or water, entering the dispensing assembly.

10 The aerosol described in JP-A-9-77115 is reasonably successful at preventing water which runs downwards along 5 the protective cap, for example, finding it easy to enter the dispensing assembly at the liquid pump.

15 When the aerosol is used, by depressing the actuating head, a liquid will be dispensed by actuation of the liquid pump and emptying of the liquid pump chamber. If 10 the actuating head is then released, the pump will move back towards its starting position, during which movement the pump chamber is filled with liquid. While the pump chamber 20 is being filled, liquid is withdrawn from the liquid container. This volume of liquid which has been removed has 15 to be compensated for by admitting air to the liquid container from the protective cap.

25 When the actuating head is depressed, the space which is enclosed by the actuating head and the inner wall of the annular recess will be reduced in size. When the 20 actuating head moves back into its starting position, this volume will increase in size. This also has to be 30 compensated for by admitting air.

35 In both cases, air will be drawn into the dispensing assembly between the inner wall of the annular recess and 25 the protective cap. It is thus nevertheless possible for leakage water, possibly contaminated with dispensed liquid, conceivably in the form of a foam, to enter the dispensing assembly.

40 Products which are to be dispensed using aerosols 30 are frequently sticky once they have dried and therefore, if they reach the dispensing assembly, can considerably impede and even completely disrupt operation thereof.

45 It is also the case that the liquids to be dispensed are frequently liquids which give rise to the formation of 35 foam, with all the associated disadvantages.

50 It will be clear that it is also highly undesirable if there is any possibility of foreign substances from the environment entering the liquid container together with the leakage water.

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5 The object of the present invention is to provide a  
solution to the above problems, and to this end the  
invention is characterized, in that the shape of the recess  
10 is such that the inner wall, on the side which is remote  
5 from the base, is at a radial distance  $p$  from the protective  
cap, which distance  $p$  is greater than the usual clearance  
distance of the protective cap with respect to the inner  
wall.

15 Due to the particular shape of the inner wall of the  
10 recess in the aerosol according to the invention, any liquid  
which is sucked up during the restoring movement of the  
dispensing head can be temporarily accommodated in the space  
20 between the inner wall which is of particular design and the  
protective cap. Once the restoring movement has been  
15 completed, at the latest, the liquid can easily flow out of  
this space to the outlet openings or can be pressed out  
25 during a subsequent actuation.

The particular design of the aerosol according to  
the invention makes it virtually impossible for water to  
20 enter the dispensing assembly from outside the aerosol. All  
the leakage water will be discharged through the outlet  
30 opening(s) in the base of the recess to the environment.

The available clearance distance is understood as  
meaning a distance  $p$  as disclosed, for example, in JP-A-9-  
35 77115. This distance  $p$  is such that there is suitable  
guidance provided between the inner wall of the recess and  
the protective cap, and will in practice be relatively  
small. This distance  $p$  will be selected in such a manner  
40 that the protective cap can be successfully guided by the  
30 inner wall without unnecessary friction.

Advantageously, the distance  $p$  according to the  
invention is at least 2 mm, or the distance  $p$  is greater  
45 than or equal to 0.1 times the internal diameter  $d$  of the  
protective cap. The distance  $p$  is preferably greater than or  
35 equal to 0.3 times the internal diameter of the protective  
cap, and more preferably greater than or equal to 0.5 times  
50 the internal diameter of the protective cap. It will be  
clear that the distance  $p$  is most preferably as great as  
possible.

5 According to the invention, various shapes of the  
inner wall are possible. For example, this inner wall may  
comprise a substantially straight cylinder with a diameter  
10 5 of the protective cap, the distance  $p$  between the straight  
cylinder and the inside of the protective cap being greater  
than the available clearance distance as defined above. In  
15 this embodiment, it will be impossible for any liquid to be  
sucked up, since the distance between the inner wall and the  
20 protective cape is too great.

Preferably, however, the inner wall of the recess,  
at least in the vicinity of the side which is remote from  
20 the base of the recess, is of conical shape which narrows  
towards the base. Particularly in the latter design, which  
15 will be explained in more detail below in the figure, the  
conical shape of the inner wall will prevent any formation  
25 of bubbles in the space between the inner wall and the  
protective cap. Bubbles which form in that area will be easy  
to break up due to the increase in their surface area which  
20 occurs.

30 The basis of the present invention is that there is  
no liquid sucked up between the inner wall of the recess and  
the protective cap, or that a space is formed between the  
inner wall and the protective cap, in which any liquid which  
35 25 is sucked up can be temporarily stored and then discharged.  
These aspects will be explained in more detail below in the  
description of the figures.

40 Preferably, the dispensing assembly furthermore  
comprises an air pump with an air inlet and an air outlet.  
30 The present invention offers particular advantages if there  
is an air pump present. When the air pump chamber has been  
emptied, for example after an atomized liquid or a foam has  
45 been dispensed, this chamber has to be refilled with air  
from the environment. If, at that moment, water is present  
35 in the dispensing assembly, there is a high risk of it being  
sucked into the air pump chamber via the air inlet. Not only  
50 does this impede the operation of the air pump, it also  
disrupts the mixing ratio between the air and liquid. The  
mixing ratio is of essential import for many air/liquid

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5 mixtures which are to be dispensed. In practice, this applies in particular to so-called foam formers.

10 A foam former is an aerosol which comprises foam-forming means. Foam-forming means are, for example, one or more small meshes in the outlet passage. A foam is formed by mixing air and liquid and then passing it through the meshes. If additional leakage water, for example, is mixed with the air and the liquid, in the most serious case there will be no foam formed at all.

15 The outlet opening(s) in the base of the recess may, if necessary, be in communication with outlet means which guide the water to outside the aerosol.

20 In a particular embodiment of the aerosol according to the invention, the air pump and the liquid pump are designed as an assembly of two concentric piston pumps. Particularly with concentric piston pumps of this nature, it is imperative that any leakage of water into the dispensing assembly in the vicinity of the pumps be avoided. All this will be explained in more detail below in the description of the figures.

25 Advantageously, the internal diameter of the protective cap of the actuating head is greater than the external diameter of the piston pumps which are present. In this way, the pumps are very well protected against the penetration of water.

30 Preferably, the recess according to the invention forms a part of the dispensing assembly.

35 The invention furthermore provides a dispensing assembly which is intended for an aerosol according to the invention.

40 The invention will be explained in more detail below with reference to the appended drawing, in which:

45 Fig. 1 shows an aerosol according to the invention in the neutral position;

50 Fig. 2 shows the aerosol shown in Fig. 1 during or just after dispensing of foam;

55 Fig. 3 shows another design of an aerosol according to the invention for dispensing foam; and

Fig. 4 shows an enlarged view of the annular recess shown in Fig. 3.

Fig. 1 shows an aerosol 1 according to the invention for dispensing foam, comprising a liquid container 2 and a dispensing assembly 3. The dispensing assembly 3 is screwed onto the liquid container 2. The dispensing assembly 3 comprises a liquid pump 4 with a liquid pump chamber 5 and a liquid pump piston 6. Furthermore, there is an air pump 7 with an air pump chamber 8 and an air pump piston 9. Both pistons 6 and 9 are coupled to an actuating head 10.

The actuating head 10 comprises a dispensing opening 11 and an outlet passage 12, two small meshes 13 being present in the outlet passage 12 in order to form a foam. The head 10 furthermore comprises a circumferential protective cap 14.

A riser tube which extends to close to the bottom of the liquid container 2 and serves as an inlet for the liquid pump 4 is denoted by 15. Furthermore, the inlet to the liquid pump 4 contains a non-return valve in the form of a ball 16. The outlet from the liquid pump 4 is situated at the location indicated by 17 and can be closed off by means of a rod-like non-return valve component 18.

The outlet from the air pump 7 is situated at the location indicated by 19. A flexible sealing component is denoted by 20, comprising two annular, resilient sealing lips 21 and 22 which are used to close off and open the inlet 23 and the outlet 19 of the air pump 7.

The dispensing assembly 3 is provided with restoring means which comprise a spring 24.

When the foam former is in use, it is possible to press the actuating head 10, with the result that the pistons 9 and 6 of the air pump 7 and the liquid pump 4, respectively, are moved downwards, with the result that the volumes of the corresponding piston chambers 8 and 5, respectively, are reduced and air and liquid are dispensed to a so-called mixing chamber 25, where air and liquid are mixed, which mixture is then passed through the two small meshes 13, into the outlet passage 12, and leaves the dispensing opening 11 in the form of a foam.

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5 After foam has been dispensed, the actuating head  
10 10 is released and will be returned to its starting position  
by the spring 24. During this return movement, the non-  
return valve 16 will open and the liquid pump chamber 5 will  
5 fill with liquid from the liquid container 2, while the air  
pump chamber fills with air.

15 A vent opening for the liquid container 2 is  
denoted by 32 and is used to supply air to the interior of  
the liquid container 2 in order to compensate for the amount  
10 of liquid which has been removed from the liquid container.  
Leakage water could also enter the liquid container 2 via  
this opening. Naturally, this is undesirable.

20 The aerosol shown in Fig. 1 furthermore comprises a  
circumferential recess 27 with a base 28, an inner wall 29  
15 and an outer wall 30. In the base 28 there are a plurality  
of outlet openings 31 which are in communication with the  
environment. The inner wall 29 extends as far as an annular  
25 gap 26. The gap 26 is situated between the inner wall 29 and  
the wall 41 of the outlet passage 12. Advantageously, the  
20 inner wall 29 according to the invention extends, as far as  
possible, to the vicinity of the wall 41.

30 During use, the protective cap 14 moves up and down  
in the recess 27. It is clear that the air inlet opening 23  
of the air pump and the vent opening 32 in this case are  
35 25 situated in a space which is in communication with the  
environment only via the gap 26 between the protective cap  
14 and the inner wall 29 and the gap 35 and 36. In other  
words, the inner wall 29 substantially adjoins the actuating  
40 head 10 in the vicinity of the outlet passage 12.

30 The distance p between the inner wall 29 and the  
protective cap 14 in the vicinity of that side of the inner  
wall 29 which is remote from the base and the internal  
45 diameter d of the protective cap 14 are also indicated in  
the figures.

35 Fig. 2 shows the aerosol from Fig. 1 in the  
depressed position, i.e. during or immediately after  
dispensing of foam. Corresponding components are denoted by  
50 the same reference numerals.



5 If, in the aerosol according to the invention as  
shown in Figs. 2 and 3, water should run along the  
protective cap 14, this water always passes only into the  
10 recess 27 and can flow out to the environment via the  
5 dispensing openings 31 in the base 28 of this recess. It is  
virtually impossible for water to enter the protective cap  
via 35 and then to reach the area of the pumps via the gap  
15 26.

10 If, during use, the aerosol is depressed as shown in  
Fig. 2, the space enclosed by the protective cap 14 and the  
inner wall 29 is reduced in size and a quantity of air is  
pressed out to the environment via gaps 35 and 36 and the  
20 outlet openings 31. It will be clear that a portion of this  
air is required in order to compensate for the increase in  
15 volume of the space above the air piston 9. However, when  
the actuating component 10 is released and it returns to the  
at-rest position, air will be sucked in via the gap 35. If,  
25 at that moment, there is liquid in the recess 27, this  
recess will collect in the space between the protective cap  
20 14 and the inner wall 29, at the location indicated by 37.  
Due to the locally conical design of the inner wall 29, as  
indicated at 38, any such liquid which is sucked up will  
30 never be able to reach the dispensing assembly via 26. The  
water will be pressed out via 35 during the subsequent  
35 25 actuating stroke. Preferably, however, the gap 35 is  
sufficiently large for any liquid which has been sucked up  
to be able to flow out of the space 37 to the outlet  
openings 31 in the at-rest position.

40 Fig. 3 shows a preferred embodiment of the aerosol 1  
30 according to the invention, in which all the components are  
identical to those shown in the previous figures, but the  
inner wall 29 is of conical design over virtually its entire  
45 length. This again offers the considerably advantage that if  
the recess 27 contains liquid, for example water, which is  
35 sucked up into the space defined by the conical inner wall  
29 and the protective cap 14, this liquid cannot reach the  
dispensing assembly via 26.

50 If, in addition to liquid, air is also sucked  
through the liquid situated in the recess 27, for example

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via the outlet openings 31, the surface area of any bubbles which form, due to the conical shape of the inner wall 29, is increased to such an extent that these bubbles will easily break-up. This can be seen clearly in Fig. 4, which shows an enlarged view of the recess 27 shown in Fig. 3. In this figure, the formation of a bubble and the way in which it breaks up is indicated by dashed lines 40.

## Claims

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## CLAIMS

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1. Aerosol for dispensing a liquid, in particular in the form of a foam, at least comprising a liquid container (2) and a dispensing assembly (1) which is coupled thereto at least in liquid-tight manner, the dispensing assembly (1) comprising a liquid pump (4) with a liquid inlet (15) and a liquid outlet (17), and an actuating head (10), the actuating head (10) comprising an outlet passage (12) and a dispensing opening (11) for dispensing the liquid, while the actuating head (10) furthermore comprises a closed, circumferential protective cap (14), the aerosol furthermore comprising a circumferential recess (27), into which the protective cap (14) can move, which recess (27) comprises a closed inner wall (29), an outer wall (30) and a base (28), and one or more outlet openings (31) are present in the vicinity of the base (28) of the recess (27), characterized in that the shape of the recess (27) is such that the inner wall (29), on the side which is remote from the base (28), is at a radial distance  $p$  from the protective cap (14), which distance  $p$  is greater than the usual clearance distance of the protective cap (14) with respect to the inner wall (29).

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2. Aerosol according to claim 1, characterized in that the distance  $p$  is at least 2 mm.

3. Aerosol according to claim 1, characterized in that the distance  $p$  is greater than or equal to 0.1 times the internal diameter  $d$  of the protective cap (14).

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4. Aerosol according to one or more of claims 1-3, characterized in that the inner wall (29) of the recess (27), at least in the vicinity of the side which is remote from the base (28) of the recess (27), is of a conical shape which narrows towards the base (28).

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5. Aerosol according to one or more of the preceding claims, characterized in that the dispensing assembly (3) furthermore comprises an air pump (7) with an air inlet (23) and an air outlet (19).

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5           6.       Aerosol according to claim 5, characterized in that  
the air pump (7) and the liquid pump (4) are designed as an  
assembly of two concentric piston pumps.

10           7.       Aerosol according to one or more of the preceding  
5 claims, characterized in that the internal diameter of the  
protective cap (14) of the actuating head (10) is greater  
than the external diameter of the piston pumps which are  
present.

15           8.       Aerosol according to one or more of claims 1-7,  
10 characterized in that the recess (27) forms a part of the  
dispensing assembly (1).

20           9.       Dispensing assembly intended for an aerosol  
according to one or more of claims 1-8.

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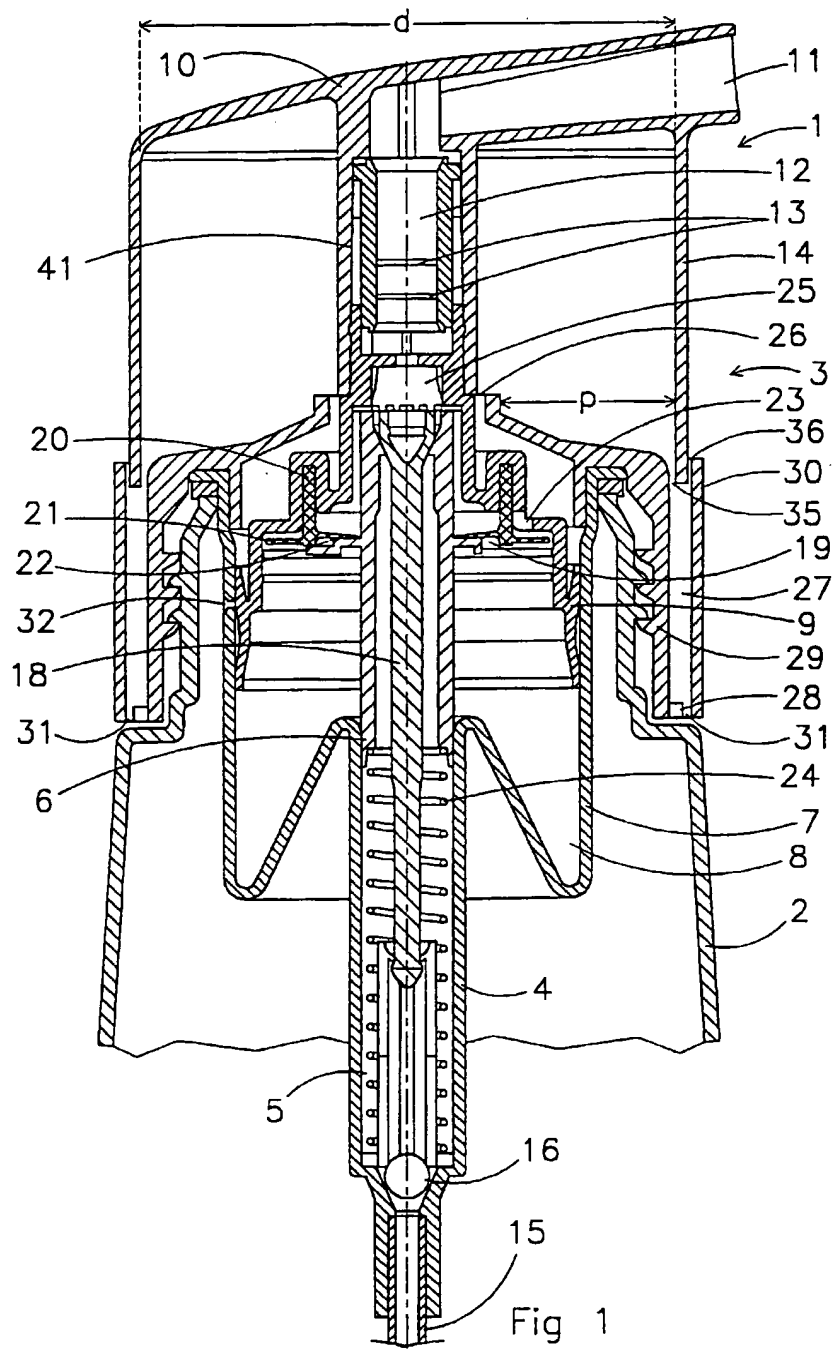
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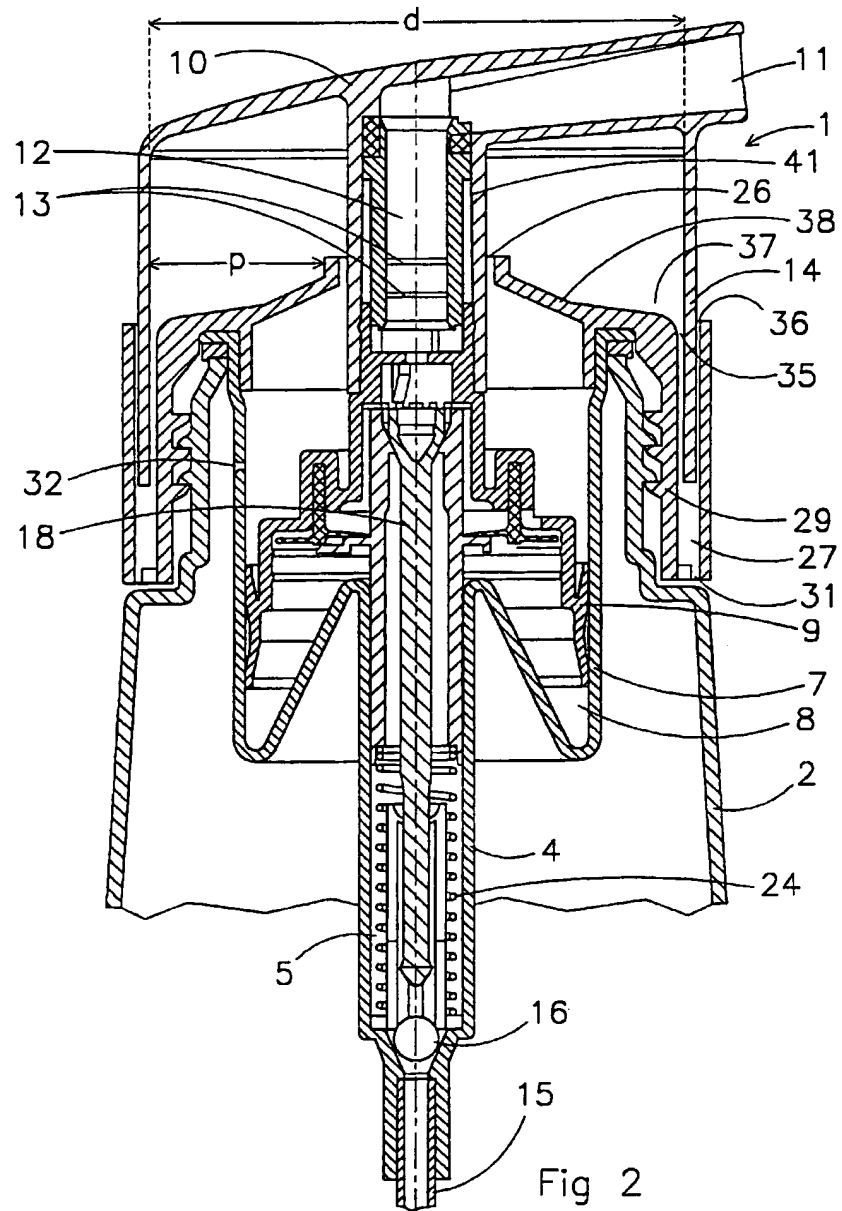
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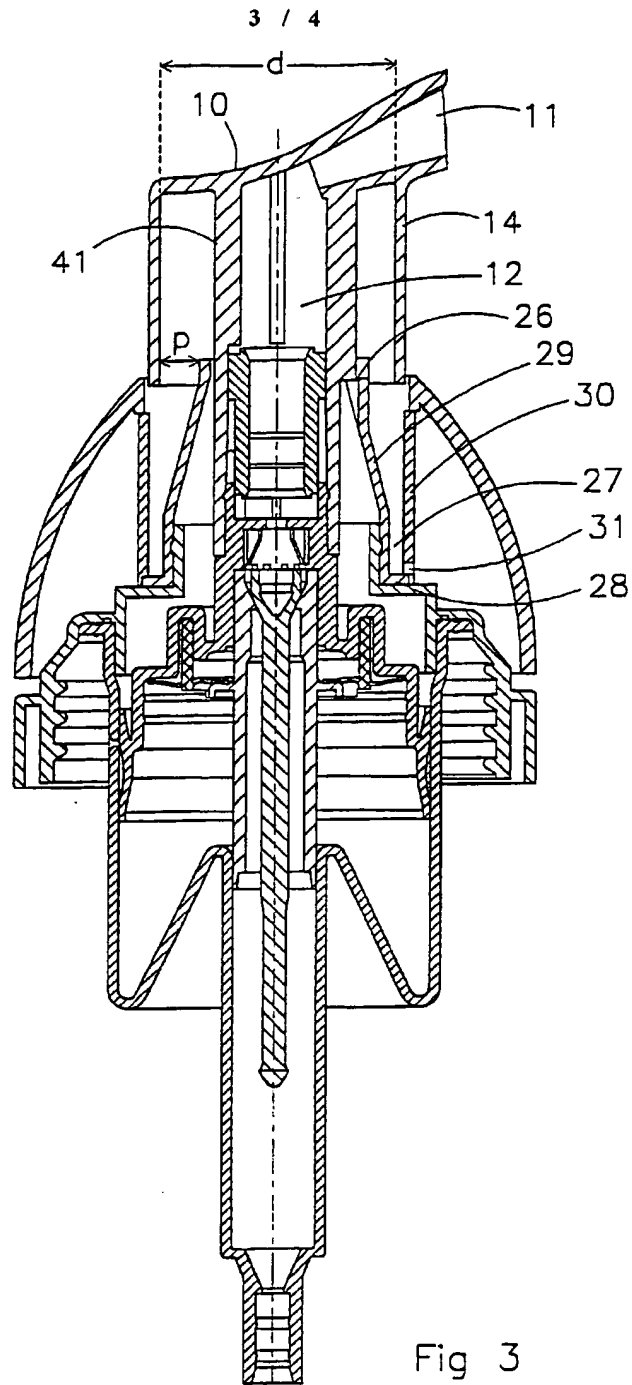
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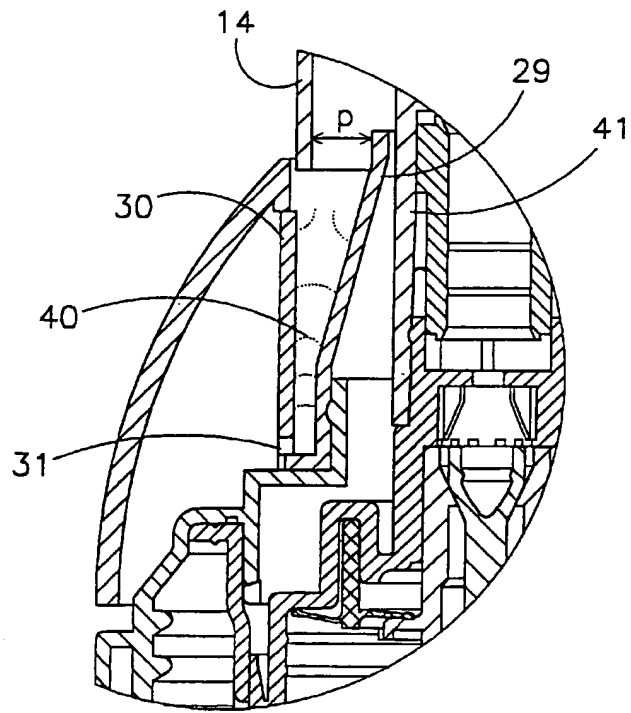


Fig 4

# INTERNATIONAL SEARCH REPORT

Int'l Application No  
PCT/NL 00/00441

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B65D47/34 B05B11/00 B05B7/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 07, 31 July 1997 (1997-07-31) & JP 09 077115 A (YOSHINO KOGYOSHO CO LTD), 25 March 1997 (1997-03-25) abstract	1-3,5-9
Y	PATENT ABSTRACTS OF JAPAN vol. 012, no. 421 (C-541), 8 November 1988 (1988-11-08) & JP 63 151370 A (HIROSHI KONDO), 23 June 1988 (1988-06-23) abstract	1-3,5-9
A	EP 0 618 147 A (BESPAK PLC) 5 October 1994 (1994-10-05) abstract; figure 4	1-9
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

6 October 2000

Date of mailing of the international search report

18/10/2000

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/NL 00/00441

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	FR 2 748 407 A (VALOIS) 14 November 1997 (1997-11-14) abstract; figure 7	1-9
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Information on patent family members

International Application No

PCT/NL 00/00441

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1/3,AB,LS/1

DIALOG(R) File 351:Derwent WPI

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WPI Acc No: 2001-612001/ 200171

XRAM Acc No: C01-183028

Foam-producing body cleansing composition contains a sulfosuccinic acid monoester salt surfactant together with an amphi- or betaine-surfactant

Patent Assignee: HENKEL KGAA (HENK )

Inventor: SCHELGES H; SCHOLZ W

Number of Countries: 031 Number of Patents: 003

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
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WO 200160332	A1	20010823	WO 2001EP1348	A	20010208	200171
AU 200131713	A	20010827	AU 200131713	A	20010208	200176

Priority Applications (No Type Date): DE 1007321 A 20000217

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
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DE 10007321	A1		5	A61K-007/48	
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WO 200160332	A1	G		A61K-007/50	
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Abstract (Basic): DE 10007321 A1

Abstract (Basic):

NOVELTY - A foam-producing body cleansing product comprises an aqueous cleanser in a non-aerosol dispenser with a foam valve (air foamer), the cleanser comprising (wt):

(A) a sulfosuccinic acid monoester salt surfactant (5-20%);

(B) an amphi- or betaine-surfactant (1-10%); and

(C) water (60-90%).

USE - Cleansing of the skin and hair.

ADVANTAGE - The combination of (A) and (B) gives creamy, fine-celled foams which are non-irritating to the skin.

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